CLAIMS

What is claimed is:

1.   A method of applying radiation comprising:

5   measuring a first set of signal data representative of a physiological movement of a patient during a first time period;

pattern matching the first set of signal data with a second set of signal data related to measured physiological movement of a patient during a second time period; and

applying radiation to the patient based upon results of the pattern matching.

10

2.   The method of claim 1 in which the first set of signal data and the second set of signal data are pattern matched using an autocorrelation function.

3.   The method of claim 1 in which the first set of signal data and the second set of

15   signal data are pattern matched using an absolute difference function.

4.   The method of claim 1 further comprising:

determining a degree of match between the first set of signal data and the second set of signal data.

20

5.   The method of claim 4 in which the degree of match is determined by a secondary peak value of an autocorrelation function.

6.   The method of claim 4 in which the degree of match is determined by a secondary

25   minimum value of an absolute difference function.

7.   The method of claim 4 further comprising:

comparing the degree of match to a threshold range.

30   8.   The method of claim 7 in which the degree of match outside the threshold range indicates deviation from a normal physiological movement.

9. The method of claim 7 in which the degree of match within the threshold range indicates a repetitive physiological movement.

10. The method of claim 9 in which a point of best match indicates a period of the
5   physiological movement.

11. The method of claim 1 further comprising:
predicting a period of the physiological movement during a third time period.

10 12. The method of claim 11 further comprising:
predictively actuating a gating system component based upon the predicted period.

13. The method of claim 1 further comprising:
determining a period of the physiological movement.

15

14. The method of claim 13 further comprising;
defining a treatment interval to apply radiation to a patient.

15. The method of claim 14 in which the treatment interval is defined based upon a
20   phase range of the period of the physiological movement.

16. The method of claim 1 in which the second set of signal data is a data model of the physiological movement of the patient.

25 17. A method for applying radiation comprising:
determining a period of physiological movement;
applying radiation based upon a phase range of the period of the physiological movement.

30 18. The method of claim 17 in which the period of physiological movement is determined by pattern matching a first set of data representative of the physiological movement during a first time period with a second set of data related to the physiological movement during a second time period.

19.   The method of claim 18 in which the first set of data and the second set of data are pattern matched using an autocorrelation function.

5   20.   The method of claim 18 in which the first set of data and the second set of data are pattern matched using an absolute difference function.

21.   A method of applying radiation comprising:
        determining an amount of time required to actuate a gating component;
10   predictively actuating the gating component to compensate for the amount of time required to actuate the gating component.

22.   The method of claim 21 in which said gating component is a switch operatively coupled to a radiation source.

15

23.   The method of claim 21 further comprising:
        predicting a next period of physiological movement.

24.   The method of claim 23 in which a treatment interval is defined over the
20   physiological movement.

25.   The method of claim 24 in which the gating component is predictively actuated to coincide the full actuation of the gating component with a boundary of the treatment interval.